For each question, select the best answer from the four alternatives.

1. The term *kinematics* is best described as
   (a) a term used to quantify motion
   (b) the study of position
   (c) the study of how objects move
   (d) a term used to quantify inertia (1.1) K/U
2. Suppose you attach a string to the beginning of a winding path and walk to the end. There, you pull the string straight and measure its length. What would you be measuring? (1.1) K/U
   (a) displacement
   (b) distance
   (c) direction
   (d) position
3. You walk 27 m [W] and 12 m [E]. What is the total distance you have travelled? (1.1) K/U
   (a) 29 m
   (b) 15 m
   (c) 39 m
   (d) 25 m
4. Which of the following involves only a scalar? (1.1) K/U
   (a) A fish swims 20 m [E].
   (b) A truck accelerates at 8 m/s^2.
   (c) A bus driver drives 30 km/h [N].
   (d) A giraffe runs 10 m [S].
5. A cyclist travels 36 km in 3.0 h. What is her speed in metres per second? (1.2) T/I
   (a) 3.0 m/s
   (b) 3.3 m/s
   (c) 5.2 m/s
   (d) 12 m/s
6. For a straight line on a position–time graph, the rise refers to the change in which quantity? (1.2) T/I
   (a) slope
   (b) time
   (c) velocity
   (d) position
7. The slope of a position–time graph measures which of the following quantities? (1.2) K/U
   (a) average acceleration
   (b) instantaneous velocity
   (c) average velocity
   (d) distance
8. For the position–time graph of an object moving in one dimension, which of the following properties would imply that the object has motion with non-uniform velocity? (1.2) K/U
   (a) The graph is a straight line with a slope of 3.
   (b) The graph is a curve.
   (c) The graph is a horizontal line.
   (d) The graph is a negative line.
9. An object accelerates at a rate of 1.2 m/s^2 [W] for 2.0 s and has an initial velocity of 5.0 m/s [E]. What is its final velocity? (1.3) T/I
   (a) 1.4 m/s [E]
   (b) 2.6 m/s [E]
   (c) 6.2 m/s [W]
   (d) 7.4 m/s [W]
10. If you were to find the area under a velocity–time graph, which of the following quantities would you be calculating? (1.5) K/U
    (a) displacement
    (b) instantaneous velocity
    (c) average acceleration
    (d) time
11. Which of the following directions is equivalent to [E 31.7° S]? (2.1) K/U
    (a) [E 31.7° N]
    (b) [S 58.3° E]
    (c) [S 68.3° E]
    (d) [S 31.7° W]
12. How long would a distance of 625 m be if represented on a scale diagram with a scale of 1 cm : 125 m? (2.1) T/I
    (a) 5.0 cm
    (b) 4.5 cm
    (c) 4.0 cm
    (d) 3.5 cm
13. If you are standing next to a wall that runs east and west, and move a displacement of $\Delta\vec{d} = 25$ m [E 63° S], approximately how far away from the wall would you be? (2.2) T/I
    (a) 11 m
    (b) 16 m
    (c) 22 m
    (d) 25 m [E]

14. A plane has to steer off course to go around a large storm. In doing so it travels 60.0 km [N] and 75 km [E]. What is the displacement of the plane after travelling off course? (2.2) T/I
    (a) 135 km [N 41° E]
    (b) 121 km [S 51° E]
    (c) 112 km [N 59° E]
    (d) 96 km [N 51° E]
15. A river has a current of 2.3 m/s. A man points his boat so that it is directed straight across the river. In still water the boat can move with a speed of 3.2 m/s. What is the average speed of the boat while travelling across the river? (2.2) T/I
    (a) 1.1 m/s
    (b) 2.8 m/s
    (c) 3.9 m/s
    (d) 5.5 m/s
16. A projectile is launched with an initial velocity of 42 m/s at an angle of 70° with the horizontal. What is its initial vertical velocity? (2.2, 2.3) T/I
    (a) 49 m/s [up]
    (b) 39 m/s [up]
    (c) 24 m/s [up]
    (d) 14 m/s [up]
17. A basketball is shot with an initial velocity of 16 m/s at an angle of 55°. What is the approximate horizontal distance that the ball travels in 1.5 s? (2.2, 2.3) T/I
    (a) 9.1 m
    (b) 13 m
    (c) 14 m
    (d) 20 m
18. Whom did Albert Einstein consider to be the father of modern science? (2.4) K/U
    (a) Aristotle
    (b) Newton
    (c) Galileo
    (d) Descartes

Indicate whether each statement is true or false. If you think the statement is false, rewrite it to make it true.

19. If your position is 20 m [W] and you change the reference point to a location that is 20 m [E] of the previous reference point, then your new position is 0 m. (1.1) K/U
20. The terms *vector* and *scalar* both refer to quantities that have magnitude and direction. (1.1) K/U
21. Vector scale diagrams show the vectors associated with a displacement, drawn to a particular scale. (1.1) K/U
22. If a squirrel runs 5.0 m [S] and then runs 7.0 m [N], then the displacement of the squirrel is 2.0 m [S]. (1.1) T/I
23. If you measure the total distance that an object travels and divide this by the time it took to travel, then you will get the average velocity. (1.2) K/U
24. An object in motion that changes direction can have uniform velocity. (1.2) K/U
25. To find the acceleration of an object, you calculate the slope of the velocity–time graph. (1.3) K/U
26. A girl riding a bike who accelerates at a rate of 0.8 m/s^2 for 3.0 s will have a final velocity of 3.5 m/s [forward] if she starts with an initial velocity of 1.1 m/s [forward]. (1.3) T/I
27. When comparing two velocity–time graphs, the one with the steeper slope will have a smaller acceleration. (1.4) K/U
28. When an object reaches terminal velocity, it will fall at a constant acceleration. (1.6) K/U
29. According to Transport Canada, fuel consumption could drop by as much as 50 % if drivers reduced their speed on the highway from 120 km/h to 100 km/h. (1.7) K/U
30. A diagram depicting a human tissue cell could reasonably have a diagram scale of 1 nm : 1 cm. (2.1) K/U
31. The direction of the vector 5 m [E 41° S] has the same direction as the vector 2 m [S 49° E]. (2.1) K/U
32. The resultant vector is determined by taking the difference between two vectors. (2.1) K/U
33. When you are given two component vectors and you want to determine the angle of the resultant vector, you should use the inverse cosine function. (2.2) K/U
34. A vector with components of 11 m [E] and 20 m [S] has a direction of S 61° E. (2.2) T/I
35. A vector that has a magnitude of 8.9 m and an x-component of 5.2 m has a y-component of 3.7 m. (2.2) K/U
36. Computing the component vectors of a projectile can be done separately because the two components are independent of one another. (2.3) K/U
37. The time of flight for a projectile that is dropped from a height of 3.0 m is 0.61 s. (2.3) T/I
38. Galileo studied the motion of objects by rolling balls down inclined planes and noting the time it took each ball to travel the given distance. (2.4) K/U
39. Tiny accelerometers that can measure the tilt and position of a device are used in cellphones and gaming devices. (2.5) K/U